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ABSTRACT

A survey was taken of industrial arts students, parents, teachers, and administrators in Virginia to determine how they perceived secondary industrial arts programs and objectives. Researchers administered a questionnaire to a sample of 32 middle schools and 25 senior high schools over a spectrum of urban, suburban, and rural areas. A total of 883 parents, 1,662 industrial arts students, 275 industrial arts teachers, and a majority of industrial arts supervisors and teacher educators in the state completed and returned the questionnaires. Results showed that students, parents, and teachers ranked the objectives of the industrial arts program almost identically. Those elements associated with tools and machines ranked first in importance. Occupational information ranked second. Rankings representing technical culture and consumer information fell near the middle, while elements associated with use of leisure time and problem-solving skills were ranked of least importance by all groups of respondents. From these data it was concluded that although numerous efforts have been expended to promote technology as a part of industrial arts, it appears that traditional industrial arts values still remain dominant. Emphasizing technology may be of importance at some level of instruction, but it does not presently appear to have overwhelming support or understanding at the public secondary school level. (KC)

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FINAL REPORT

STUDY TO DETERMINE THE BENEFITS OF
INDUSTRIAL ARTS INSTRUCTION ON
SECONDARY STUDENTS IN VIRGINIA

RESEARCH

Conducted Under
Vocational Education Amendments of 1976
Public Law 94-482

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ABSTRACT

Title of Project: Study To Determine The Benefits Of Industrial Arts Instruction On Secondary Students In Virginia

Time Period: Two Year Project (July 1, 1980 to June 30, 1982)

Goals and Objectives:

1. Conducted a survey of industrial arts students, parents, teachers and administrators to determine the perception of Industrial Arts Education Programs and objectives.
2. Established an advisory committee of teachers, state supervisors, local supervisors, teacher educators, students and national standard project representatives.
3. Design a research instrument, and computer program to obtain data from the demographic population identified in the project design.
4. Provided the Industrial Arts Division of the State Department of Education with completed study results.

Procedures of Implementation:

1. Established the research office at George Mason University in September 1980 for correspondence, purchasing and budgeting.
2. Established State Project Advisory Committee to monitor project.
3. Conducted a historical review of appropriate Industrial Arts research data that assisted in determining the projects design.
4. Developed a research instrument including the graphic design and computer program development for survey and tabulation data.
5. Identified the demographics of the study including population to be surveyed and geographical locations of schools.
6. Respondents completed research instruments and computer scoring was conducted with appropriate statistical procedures applied.
7. Results were reviewed, tabulated, and compiled for final reports presented to the State Department of Education.

Results:

The study determined what industrial arts objectives are receiving the most emphasis in the secondary schools of Virginia. The research also compared how the different respondent groups view the importance of each industrial arts objective. Additional information was obtained on reasons for enrolling in industrial classes and opinions as to the importance of various Industrial Arts subject content.

Evaluation:

The project was constantly evaluated by the Advisory Group and State Department of Education Office of Vocational Education Research Division.

Conclusions:

The project was completed and all goals met within the prescribed time table and budget limits. The benefits derived from Industrial Arts by secondary students were prioritized in the objectives and program elements rated by the parents, teachers, and students. The results helped identify a fundamental base for the development of future curriculum materials regardless of subject area or student grade levels.

INTRODUCTION

Virginia Industrial Arts instructional content has significantly changed during the decade of the seventies. Based on the State Department publication "Industrial Arts for the Seventies" numerous new courses and programs were developed and implemented on a state-wide basis. Many teachers throughout the state received additional in-service training relating to these new teaching methodologies and course content. Colleges also began to revamp and revise core courses to meet this new state direction. Additional state funding was brought about by new federal guidelines on industrial arts which were then incorporated in the Virginia Vocational Education State Plan. Local school divisions began to more readily adopt these new curriculum innovations since cost factors were reduced through the additional state funding. These significant curriculum changes brought national recognition to Virginia's many teacher educators, administrators, teachers and students. Student clubs flourished and Virginia was perceived as a leader in this endeavor.

The terminology and structure of course content was significantly changed to reflect such leaders and philosophers as William E. Warner, Donald Maley, Delmar Olsen and Paul De Vore. A study was needed to determine if these content changes were perceived by industrial arts students, industrial arts administrators, educational administrators outside the industrial arts profession, and parents. This study also determined the degree to which these perceptions met the objectives outlined in federal and state guidelines. Through further

scientific investigation to determine the attitudinal perceptions of various students, administrators and parents as to the specific benefits received from industrial arts, new programs emphasizing a curriculum based on American industry and technology can more effectively be developed and implemented.

PURPOSE OF STUDY

The purpose of the study was to obtain statistical data and information for the improvement of industrial arts programs that are supported by the State Department of Education and legislated under P.L. 94-482. This study attempted to determine if any significant differences existed in the perceptions of students, parents, and educators based on present course content and past experiences. Furthermore, the study ranked the industrial arts objectives based on various student awareness factors such as course content, geographical location and grade level placement. Another major thrust of the project was to increase the statistical data base relating to the purposes of industrial arts by providing scientific information obtained from parents and other educators who have had either direct or indirect contact with industrial arts programs. A major outcome of this project was to increase the effectiveness of future curriculum efforts in meeting the desired objectives of the industrial arts offerings.

GOALS OF PROPOSED STUDY

The goal of this project was to establish a data base from which future curriculum materials could be developed and implemented, thus ensuring a quality industrial arts program in urban, rural, and suburban areas of the state of Virginia. The findings and recommendations on the goals and objectives of industrial arts will be provided for documentation. Also included are

general objectives for all industrial arts courses and specific objectives specifically designated for certain courses.

The proposed duration of the project was two years, based on proposed FY '81 Vocational Education Plan. Phase I in the first year concentrated on geographical location of test sites, advisory committee development and input, development and pilot testing of the survey instrument, and administering the final instrument in May, 1981. Phase II emphasized the statistical treatment of data, tabulation, and documentation of findings.

OVERALL PROJECT OBJECTIVES

The project accomplished the following specific objectives:

1. Identified and reaffirmed the twelve purposes of industrial arts stated in Chapter 2., "Report of Survey," submitted by the "Standards for Industrial Arts Education Program Project" (RFP 78-129); Project No. 498AH80061; Contract No. 300-78-0565 and properly classify these objectives in the survey form, data and design.
2. Established an advisory committee of teachers, state supervisors, local supervisors, teacher educators, students and national standard project representatives that reflects the state industrial arts regions and rural, urban, and suburban populations.
3. Conducted a survey of industrial arts students, their parents, teachers and administrators to determine the perception of each survey group relating to the objectives defined in the "Standards for Industrial Arts Education Programs Project."
4. Established a geographical plan for obtaining data from each of the six state industrial arts regional areas.
5. Identified junior and senior high schools reflecting rural, urban, and suburban population in each area as potential evaluation centers.
6. Established a quota of junior and senior schools for each industrial arts region based on industrial arts student enrollments as projected by the State Department of Education.

7. Selected specific grade levels and industrial arts classes to be involved in the study in each project school.
8. Selected previous industrial arts graduates and parents to be surveyed relating to their perception of industrial arts program objectives.
9. Stratified and identified prospective schools according to proper classification as middle, junior high, or senior high schools.
10. Established a program utilizing modern technological equipment to read and compile data for the implementation of proper statistical procedures and classification of results.
11. Developed a machine read mark-sense survey instrument that addressed the objectives stated in Chapter 2 of National RFP 78-129, and obtained the approval for use of this instrument from the Industrial Arts Division of the State Department of Education.
12. Validated and pilot tested the evaluation instrument at all levels, i.e., middle, junior high, senior high, rural, urban and suburban schools.
13. Developed a timeline for the design phase, validation, implementation, data collection, evaluation, and dissemination processes.
14. Provided the Industrial Arts Division of the State Department of Education complete study results including the statistical report on significant findings.

IMPLEMENTATION PROCEDURES

Establishment of the Office

On September 8, 1980 Mrs. Juliet Johnson was employed by George Mason University as secretary for Vocational Education which is in charge of this research project. The office is located on the main campus of George Mason University, Room 3400, Robinson Hall. All necessary correspondence, budgeting, and purchasing of equipment and supplies required to operate the project was accomplished. The State Advisory Committee was contacted and the initial meeting was conducted as indicated in the project time table. See (Appendix A) for correspondence.

Advisory Committee

The initial meeting of the State Advisory Committee was held on September 26 and 27, 1980 at the main campus of George Mason University. The meeting was called to order at 7:00 p.m. by the project director. Each committee member was given an information folder containing the program assignments, required work sheets, and historical data. The Friday evening meeting adjourned at 10:30 p.m. The Saturday meeting began at 8:30 a.m.; all anticipated work had been accomplished by adjournment at 1:30 p.m. All members of the State Advisory Committee (Appendix B) were present and the project director presented the Committee with the following proposed two-day agenda.

Friday evening, September 26, 1980

7:00 - Introduction of Steering Committee Members

7:10 - Word of Welcome - Dean Larry Bowen

7:20 - Travel Forms and Arrangements

7:30 - Overview of Project

7:45 - Review of Evaluation Format

8:00 - Industrial Arts Objectives

(a) Standards Project

(b) Schmitt/Pelley Report (1963)

(c) Olson's Dissertation (1975)

(d) Virginia State Department Objectives

8:30 - Group Assignments--Objectives

Group A

*George Litman
Hugh Byrd
Ward Lockett
Bernard Hairston
Pete Fulcer

Group B

*Dave Marsh
Bill Eister
Jerry Hardy
Dave White
Jim Haynie

Group C

*Pete Egan
Paul Cummings
Kent Clark
Jerry Weddle
Tom Hughes

9:30 - Total Advisory Committee Approval of Industrial Arts Objectives

Saturday, September 27, 1980

8:30 a.m. - Overview of Day's Work

8:45 a.m. - Group Work on Item Analysis

10:00 a.m. - Break

10:15 a.m. - Group Reports on Item Analysis

11:30 a.m. - Finalization of Items for Instrument

12:00 - 12:45 - Lunch

12:45 p.m. - Review of Progress

1:30 p.m. - Develop Survey Sites - Future Meetings

The committee was informed of the expectations of the project, lodging accommodations, and travel reimbursement information. A copy of the travel form is shown as (Appendix C).

Historical Review of Industrial Arts Objectives

The State Advisory Committee was presented with copies of industrial arts objectives listed by V.P.I. Standards Project, 1963 Schmitt/Pelley Report, State Department of Education Division of Industrial Arts, and additional historical information related to the various function of industrial arts. These documents are included as (Appendix D). The Committee was charged with reviewing the industrial arts objectives for their historical significance. Each Committee was invited to contribute information to the group process relating to the historical development of various sets of objectives.

Advisory Committee Objective Formation and Analysis

The State Advisory Committee was divided into three work groups with

three members of the local Advisory Committee acting as group leaders. The initial task of these work groups was to analyze the Standards objective list and develop a composite list of objectives that eliminated duplication. Forms for accomplishing this are shown in (Appendix E). The V.P.I Standards Project contained twelve basic industrial arts objectives. After thoroughly analyzing the objectives lists, the Committee recommended six objectives for inclusion in the final design of the evaluation instrument. The following Figure 1 (Column 1) shows how these six objectives relate to the twelve V.P.I. Standards objectives (Column 2). The final objective list had 100% Committee approval. Some concern was expressed over the role of the American Industrial Arts Student Association. The Committee recommended further analysis of the objectives to determine if A.I.A.S.A. goals were reflected in the six basic Advisory Committee objectives.

Instrument Design and Item Analysis

The research instrument was designed with a forced-choice format. The forced-choice method required the respondent to assign weighted preference to each of the industrial arts objectives' elements. Unlike other instrument designs, this process requires the respondents to determine which objectives' elements should receive preferential treatment.

The final instrument contained sufficient cells of elements needed to represent the composite industrial arts objectives selected by the Advisory Committee. The initial meeting produced six objectives; thus the instrument will require six sets of eight elements. Each objective contained a corresponding set of elements that were examples of activities and student outcomes associated with each specific objective.

COMPOSITE OBJECTIVES AND EVALUATION ITEMS		
RESEARCH COMPOSITE OBJECTIVES	V.P.I. STANDARDS OBJECTIVES	OBJECTIVE EVALUATION ITEMS
1. Provide technical knowledge and skill in the use of tools and machines.	1. Skill in tools and machines. 2. Provide technical knowledge and skill.	1. Identify basic hand tools (hammer, saw, rule) 2. Use basic hand tools (screwdriver, wrench, square) 3. Identify basic machines (lathe, jigsaw, grinder) 4. Use basic machines (camera, drill press, band saw) 5. Care of tools & machines (sharpen drill bit, knife) 6. Build project using tools & machines. 7. Read a rule. 8. Safe working habits (wear goggles, guards)
2. Develop an understanding of the nature and characteristics of technology in our culture.	8. Understand technical culture. 11. Develop an understanding of the nature and characteristics of technology.	1. Technical reading (blueprint, drawing, words) 2. Understand how metal, wood, plastic are made. 3. History of tools & machines. 4. Understand industry (mfg., construction) 5. Understand industry (labor, management) 6. Do line & mass production activity. 7. Understand energy (solar, nuclear, electrical) 8. Understand how mechanical things work.

FIGURE 1

COMPOSITE OBJECTIVES AND EVALUATION ITEMS		
RESEARCH COMPOSITE OBJECTIVES	V.P.I. STANDARDS OBJECTIVES	OBJECTIVE EVALUATION ITEMS
3. Discover and develop creative talent for worthy leisure time interests.	3. Discover and develop creative talent. 4. Develop worthy leisure time interests.	1. Enjoy working with wood. 2. Enjoy taking pictures with camera. 3. Design and build home projects. 4. Make home repairs. 5. Do hobby, craft activities. 6. Put together model kits (electrical, leather, airplanes) 7. Tune-up auto & make minor repairs. 8. Creative design (greeting cards, T-shirts, signs)
4. Understand the application of science and math in developing problem solving skills.	12. Understand the application of science and mathematics. 5. Develop problem solving skills.	1. Know how to measure. 2. Figure the cost of a board. 3. Use metrics. 4. Do a drawing to scale. 5. Figure horsepower of engine. 6. Measure electricity using a meter. 7. Know how materials are made (chemical/physical) 8. Identify methods of home energy conservation.

FIGURE 1 (continued)

COMPOSITE OBJECTIVES AND EVALUATION ITEMS		
RESEARCH COMPOSITE OBJECTIVES	V.P.I. STANDARDS OBJECTIVES	OBJECTIVE EVALUATION ITEMS
5. Develop consumer knowledge and appreciation in use of industrial products.	10. Develop consumer knowledge and appreciation.	1. Recognize quality tools & machines. 2. Recognize good wood, metal, plastics in product. 3. Buy wisely. 4. Select materials for personal projects. 5. Identify good & poor workmanship. 6. Choose best product (auto, TV) 7. Care for furniture, auto, TV, home. 8. Understand credit system.
6. Provide pre-vocational experiences for making informed occupational-educational choices leading to vocational training.	9. Provide vocational training. 6. Make informed educational-occupational choices. 7. Provide pre-vocational experiences.	1. Job interests. 2. Compare different jobs. 3. Observe job opportunities (field trips, speakers) 4. Try job skills (plumber, bricklayer, carpenter) 5. Prepare to work in a job training class. 6. Get a job (interview, application) 7. Good work habits. 8. Job training (auto mechanic, draftsman)

FIGURE 1 (continued)

Each advisory committee group formulated a preliminary list of elements for two objectives. The lists were presented to the total advisory committee for final revision and approval. The composite list of items presented in this report and shown in Column 3 of Figure 1 have received the preliminary approval of the total state advisory committee. The committee determined that the elements chosen are reflective of the overall objective.

Advisory Committee Selection and Element Analysis/Priority Ranking

Each of the forty-eight objective elements was priority ranked by the state advisory committee. To accomplish this task, an evaluation form was sent to each committee member (Appendix F) requesting the priority ranking of the objective items. Upon completion, each objective element was ranked and ordered by weighted scores. In the development of each evaluation cell, the elements of similar ranking were grouped together. The following is a sample composite set of elements, one associated with each of the six basic objectives:

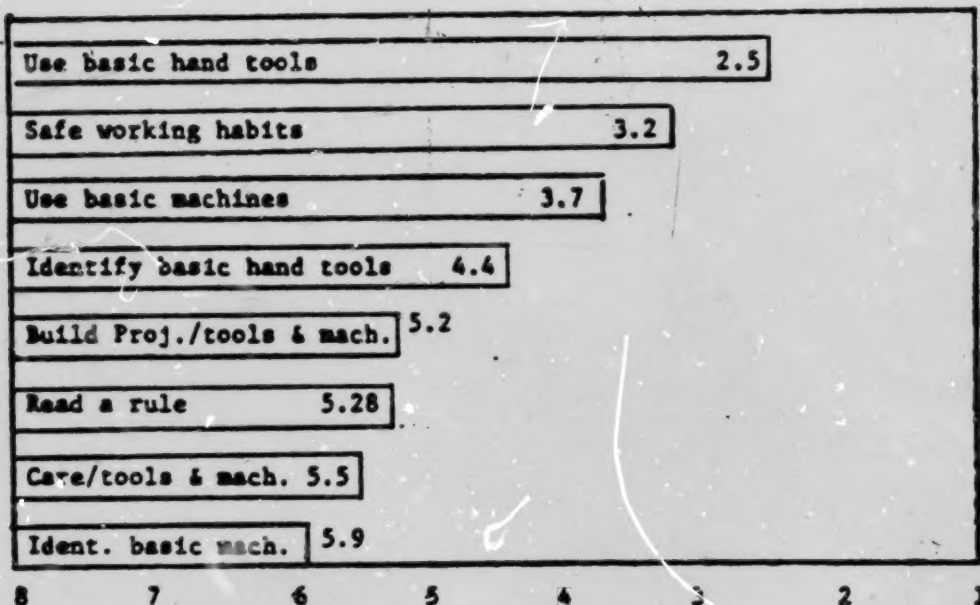
Evaluation Elements -- Sample Set A

- Objective 1. Identify basic hand tools (hammer, saw, rule).
- Objective 2. Technical reading (blueprint, drawing, words).
- Objective 3. Enjoy working with wood.
- Objective 4. Know how to measure.
- Objective 5. Recognize quality tools and machines.
- Objective 6. Job interests.

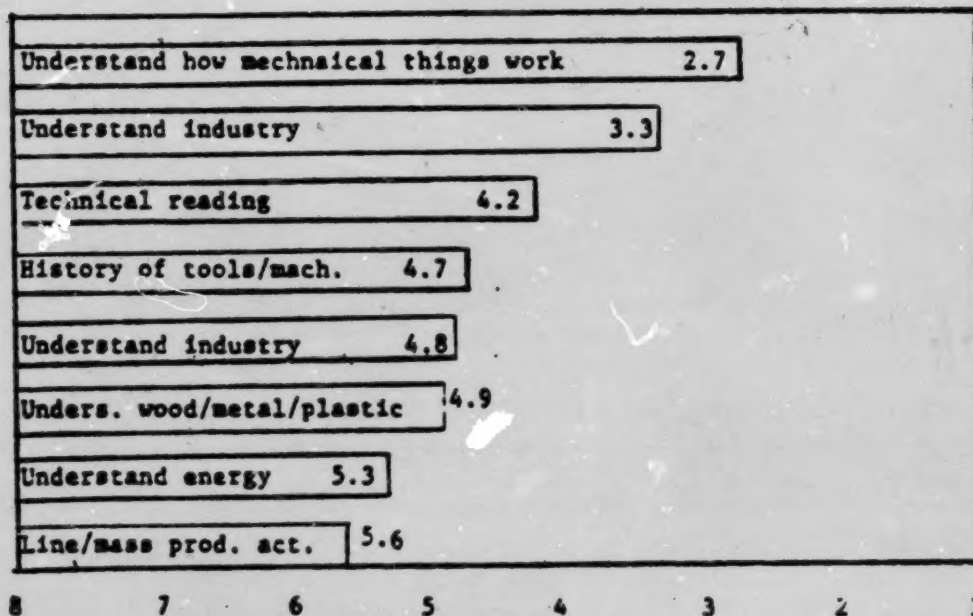
Figure #2 illustrates the weighted ranking of all forty-eight elements within their associated Industrial Arts objective.

FIGURE 2
PRIORITY RANKING SHEET

1. Provide technical knowledge and skill in the use of tools and machines.

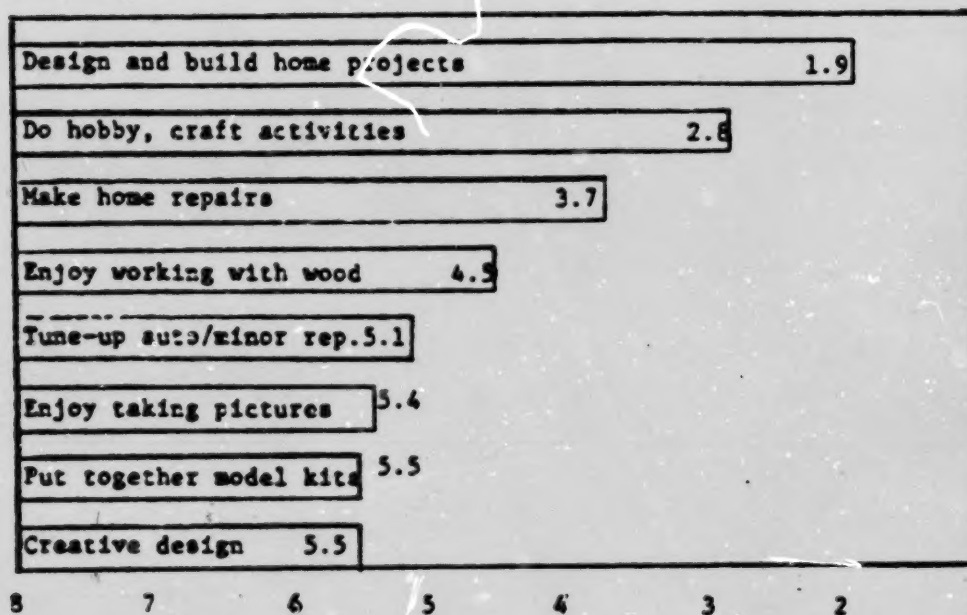


2. Develop an understanding of the nature and characteristics of technology in our culture.

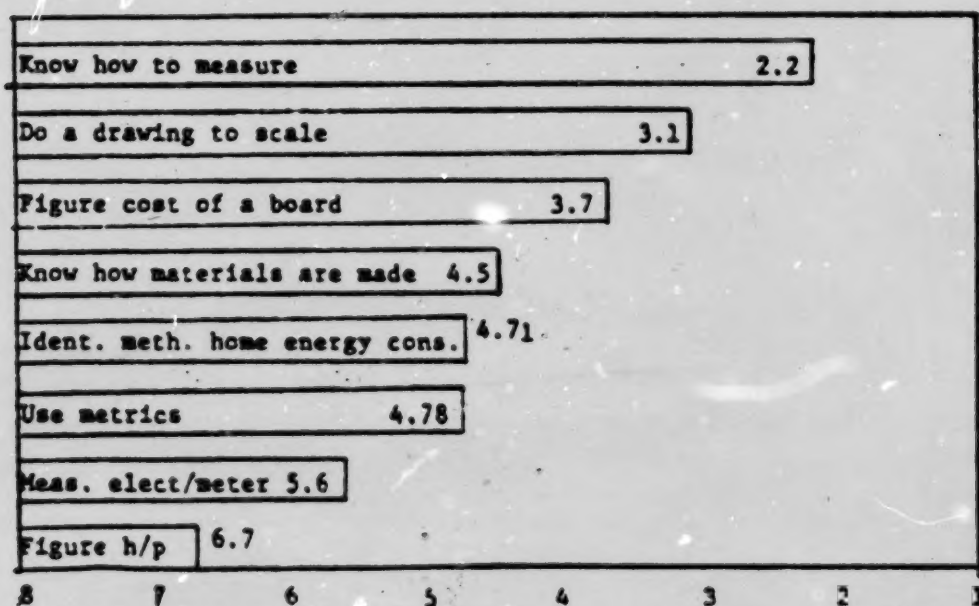


PRIORITY BANKING SHEET, PAGE 2.

3. Discover and develop creative talent for worthy leisure time interests.

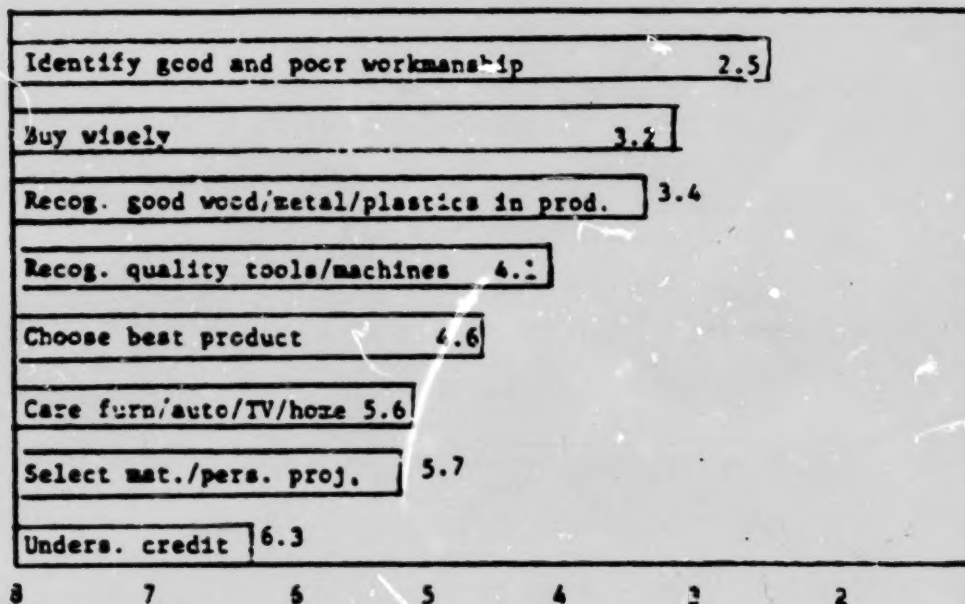


4. Understand the application of science and math in developing problem solving skills.

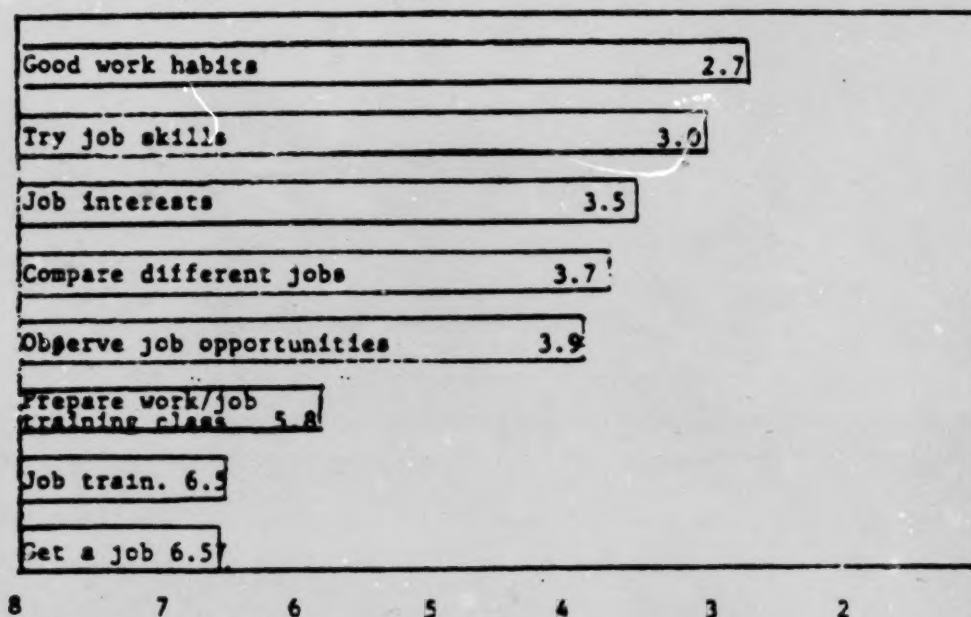


PRIORITY RANKING SHEET, PAGE 3.

5. Develop consumer knowledge and appreciation in use of industrial products.



6. Provide pre-vocational experiences for making informed occupational-educational choices leading to vocational training.



Survey Instrument Design

The research instrument in this study utilized a unique forced-choice design to establish respondent prioritizing of objectives. Since students, parents, and educators were all being surveyed, responding to the six industrial arts educational objectives written in educational terms would be difficult. To eliminate this problem, the Committee selected eight elements for each objective which were examples of items taught under a specific Industrial Arts objective. The elements used were typical industrial arts instructional items which were easily identified by students, parents, and teachers. The following is a sample of Objective I (provide technical knowledge and skill in the use of tools and machines) and its eight associated elements.

1. Identify basic hand tools (hammer, saw, rule)
2. Use basic hand tools (screwdriver, wrench, square)
3. Identify basic machines (lathe, jig-saw, grinder)
4. Use basic machines (camera, drill press, band saw)
5. Care of tools and machines (sharpen drill bit, knife)
6. Build project using tools and machines
7. Read a rule
8. Safe working habits (wear goggles, guards)

From the forty-eight instructional elements a forced-choice survey instrument was developed Figure 3 . The instrument contained eight forced-choice rating blocks. Each block contained six elements, one element for each objective. The respondent groups were requested to prioritize the six elements in each of the eight blocks. An example ranking is illustrated on the survey instrument entitled "Sample" depicting the prioritized ranking system.

To obtain an overall rating of a specific industrial arts instructional objective the eight individual element scores from each cell were summed. Mean scores were then calculated for each of the six industrial arts objectives.

FIGURE 3

1. Are you a student (S) parent (P) teacher (T) administrator (A)?	☐ S ☐ P ☐ T ☐ A
2. Are you a male (M) female (F)	☐ M ☐ F
3. (I am) (My child is) in Jr. High (JR) Senior High (SR)	☐ JR ☐ SR
4. (I am) (My child is) taking industrial arts course:	
a. Construction	☐ a
b. Manufacturing	☐ b
c. Exploring Technology, or Modern Industry and Technology	☐ c
d. Power and Transportation/Energy	☐ d
e. Communications	☐ e
f. Wood, Metal, Drafting, Electronics, Graphic Arts, other	☐ f

INSTRUCTIONS		SAMPLE MARKING
STUDENT: In your present Industrial Arts class, which of the following items do you believe is the most important to learn. Rank items from 1 (most important) to 6 (least important).		● USE NO. 2 PENCIL ● ERASE COMPLETELY ● USE EACH NUMBER
PARENT: In your opinion, which item in each block of items is the most important for your child to learn in an Industrial Arts class. Rank items from 1 (most important) to 6 (least important).		

LEARN TO:	A. Build houses	Rated 4	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	B. Work on cars	Rated 6	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	C. Observe safety rules	Rated 1	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	D. Repair furniture	Rated 2	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	E. Make plumbing repairs	Rated 3	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	F. Make wood projects	Rated 5	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
SAMPLE BLOCK			
LEARN TO:	A. Use basic hand tools (screwdriver, wrench)		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	B. Understand how mechanical things work		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	C. Design and build home projects		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	D. Measure		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	E. Identify good and poor workmanship		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	F. Use excellent job work habits		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
BLOCK I			
LEARN TO:	A. Learn about industry		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	B. Do hobby, craft activities		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	C. Do a mechanical drawing to scale		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	D. Buy materials, tools and equipment wisely		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	E. Try job skills (plumber, bricklayer)		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	F. Use safe working habits (wear goggles, guards)		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
BLOCK II			
LEARN TO:	A. Make home repairs		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	B. Figure the cost of a board		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	C. Recognize good quality wood, metal and plastic products		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	D. Explore job interests		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	E. Use basic machines (drill press, band saw)		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
	F. Read technical writings (blueprint, words)		☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
BLOCK III			

BLOCK IV	LEARN TO:	A. Know how materials are made	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		B. Recognize quality tools and machines	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		C. Compare different jobs for future work	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		D. Identify basic hand tools (hammer, saw, rule)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		E. Understand industry (labor, management)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		F. Enjoy working with wood	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
BLOCK V	LEARN TO:	A. Choose best products (auto, TV, etc.)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		B. Observe job opportunities (field trips, speakers)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		C. Build project using tools and machines	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		D. Know history of tools and machines	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		E. Tune-up automobiles and make minor repairs	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		F. Identify methods of home energy conservation	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
BLOCK VI	LEARN TO:	A. Work in a job training class	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		B. Read a ruler	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		C. Understand how metal, wood, plastic are made	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		D. Enjoy taking pictures with camera	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		E. Use metric measurement	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		F. Care for furniture, auto, TV and other home items	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
BLOCK VII	LEARN TO:	A. Care for tools and machines (sharpen drill bit)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		B. Understand energy (solar, nuclear, electrical)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		C. Put together model kits (electrical, leather)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		D. Measure electricity	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		E. Select materials for personal projects	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		F. Do job training (auto mechanic, draftsman)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
BLOCK VIII	LEARN TO:	A. Do line and mass production activities	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		B. Do creative designs (greeting cards, T-shirts)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		C. Compute the horsepower of an engine	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		D. Use credit	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		E. Get a job	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
		F. Identify basic machines (lathe, jig, saw, grinder)	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~
PLEASE ANSWER EACH QUESTION								
	1. Have you taken an Industrial Arts course?	~~YES~~	~~NO~~					
	2. Should Industrial Arts courses be required at some level?	~~YES~~	~~NO~~					
	3. Should both boys and girls have Industrial Arts experiences?	~~YES~~	~~NO~~					
	4. Which area of Industrial Arts do you believe is most important? 1=wood and metal 2=drafting 3=electronics 4=mechanics 5=construction 6=printing	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~	
	5. Reason for taking Industrial Arts course? 1=liked class 2=need credit 3=required course 4=get easy credit 5=job information 6=like to build things	~~c1~~	~~c2~~	~~c3~~	~~c4~~	~~c5~~	~~c6~~	

Proper statistical analysis was performed to determine objective priority and significance for each of the five respondent groups.

A preliminary draft of the survey instrument was submitted to the Scan-Tron Corporation for review and redesigning. The instrument is designed to provide a machine read mark-sense survey form capable of computer analysis. The form contains eight cells each with six enabling indicators reflecting a total of forty-eight necessary responses. Demographic information required by the research proposal is listed at the top of the instrument. Major demographic information obtained is respondent category, sex, school, grade level, and course selection. The final instrument met the requirements of the RFP. The document was printed by Scan-Tron Corporation on March 1, 1981 and presented to the State Supervisors and Teacher Education Council for comments and procedural recommendations.

The survey instrument was pilot tested to determine whether students and parents could properly follow the written instructions in completing the mark-sense form. An additional explanatory letter was designed to assist teachers and parents in the form completion process. A copy of the parent letter is shown as (Appendix G).

To further assist the committee in determining why students enrolled in Industrial Arts programs 5 basic programmatic questions were asked of the respondents. The questions listed at the end of the survey instrument produced additional insight into present and future trends of Industrial Arts classes demographic and course offerings.

The following is a listing of the 5 basic questions:

1. Have you taken an Industrial Arts course?
2. Should Industrial Arts courses be required at some level?
3. Should both boys and girls have Industrial Arts experiences?
4. Which area of Industrial Arts do you believe is most important?
1-wood and metal 2-drafting 3-electronics 4-mechanics
5-construction 6-printing
5. Reason for taking Industrial Arts course?
1-liked class 2-need credit 3-required course
4-get easy credit 5-job information 6- like to build things

A letter was sent through the office of the State Superintendent of Schools requesting that the identified school divisions participate in the research project. The correspondence and coordination was conducted under the guidance of Thomas Hughes, the State Supervisor of Industrial Arts. All school divisions contacted agreed to participate and each identified instructor was contacted to insure that the final demographic research population conformed with the original goals and objectives of the research proposal.

DEMOGRAPHIC DATA

Schools to participate in the survey were randomly selected by the project staff from the Virginia Industrial Arts Directory, then updated from the 1981 edition of the same directory. The final tally showed 51 county and 32 city secondary schools to be surveyed. The listing of schools and instructors are shown as (Appendix H).

Based on the recommendations of the State Advisory Committee, a total of 80 schools were selected from Virginia's secondary schools to participate in this study. Seventy-two percent of the schools surveyed returned usable data. The study design attempted to insure a proportionate balance between middle and high school respondents. Thirty-two middle schools and 25 senior high schools returned the survey form accounting for 56% and 44% respectively. An additional consideration in establishing school sample population was school location. To insure representation of all types of students, a stratified random sampling of urban, suburban, and rural locations was used. The final sample was comprised of 32% urban schools, 33% suburban schools, and 35% rural schools.

The method used to insure survey of individual schools from urban, suburban, and rural areas was based upon present categorization system incorporated by the Virginia State Department of Education. The industrial arts survey form was designed to be completed by both industrial arts students and their parents. The research design did not predetermine whether the parent completing the form would be male or female. Eight hundred eighty-three parents, or 56% of the total parent population, completed the forms and returned them to their respective schools. There were 387 male and 496 female respondents (44% and 56% respectively) to the parent survey. The final tabulation provided the study with a good balance of male and female parent respondents.

Each industrial arts teacher was to survey two of their industrial arts classes. No predetermined method was used to select the proportionate sex sample of the student population surveyed. The total number of students returning the completed survey form was 1,662. One thousand four hundred sixty-three of the total students surveyed, or 88%, were males. One hundred ninety-nine female respondents accounted for the remaining 12%. This sex ratio is similar to the present state boy/girl ratio in industrial arts classes. An additional concern of the study's demographic design was student grade level. Although the proportion of middle schools and senior high schools was determined before the study was initiated, the number of usable returns were also later categorized to insure adequate representation on a proportionate ratio by secondary school type. The total number of middle school student respondents was 950 as compared to 681 senior high respondents. This represented percentages of 56% middle school students and 42% senior high school students.

The student ratios again paralleled existing state demographic data. The grade level breakdown was further analyzed by the course types. Tabulation of student enrollment was divided by courses in the following numbers:

Construction	272	students
Manufacturing	136	"
Exploring Technology	706	"
Power and Transportation	71	"
Communications	0	"
Unit labs (wood, metal, drafting)	442	"

The largest group of respondents, 43% was in the exploring technology course. An analysis of the students by courses further indicated that the sample was representative of the state and the types of programs presented in urban, suburban, and rural schools. The following Figure 4 illustrates a breakdown of the demographic data obtained in this study.

FIGURE 4

DEMOGRAPHIC INFORMATION

<u>Schools Surveyed</u>	<u>Number</u> 80	<u>Returned</u> 57	<u>Percentage</u> 72%
<u>School Type</u>			
Total	57		100%
Middle Schools	32		56%
Senior High Schools	25		44%
<u>School Location</u>			
Total	57		100%
Urban	18		32%
Suburban	19		33%
Rural	20		35%
<u>Parents Sex</u>			
Total	883		100%
Male	387		44%
Female	496		56%
<u>Students Sex</u>			
Total	1662		100%
Male	1463		88%
Female	199		12%
<u>Student Grade Level</u>			
Total	1631		100%
Middle School Students	950		58%
Senior High School Students	681		42%
<u>Industrial Arts Courses</u>			
Total	1627		100%
Construction	272		17%
Manufacturing	136		9%
Exploring Technology	706		43%
Power and Transportation	71		4%
Communications	0		0
Wood, Metal, Drafting	442		27%

RESULTS & STATISTICAL ANALYSIS OF PROJECT DATA

Introduction

Virginia has approximately 1,100 industrial arts teachers. A random sampling of 275 teachers completed the survey form. The teacher research population consisted of a proportionate number of teacher respondents from urban, suburban, and rural schools. The teacher sample also represented junior and senior high school instructors. A majority of industrial arts supervisors and teacher educators in Virginia also completed the survey form. The analysis of the data is provided for all five respondent groups.

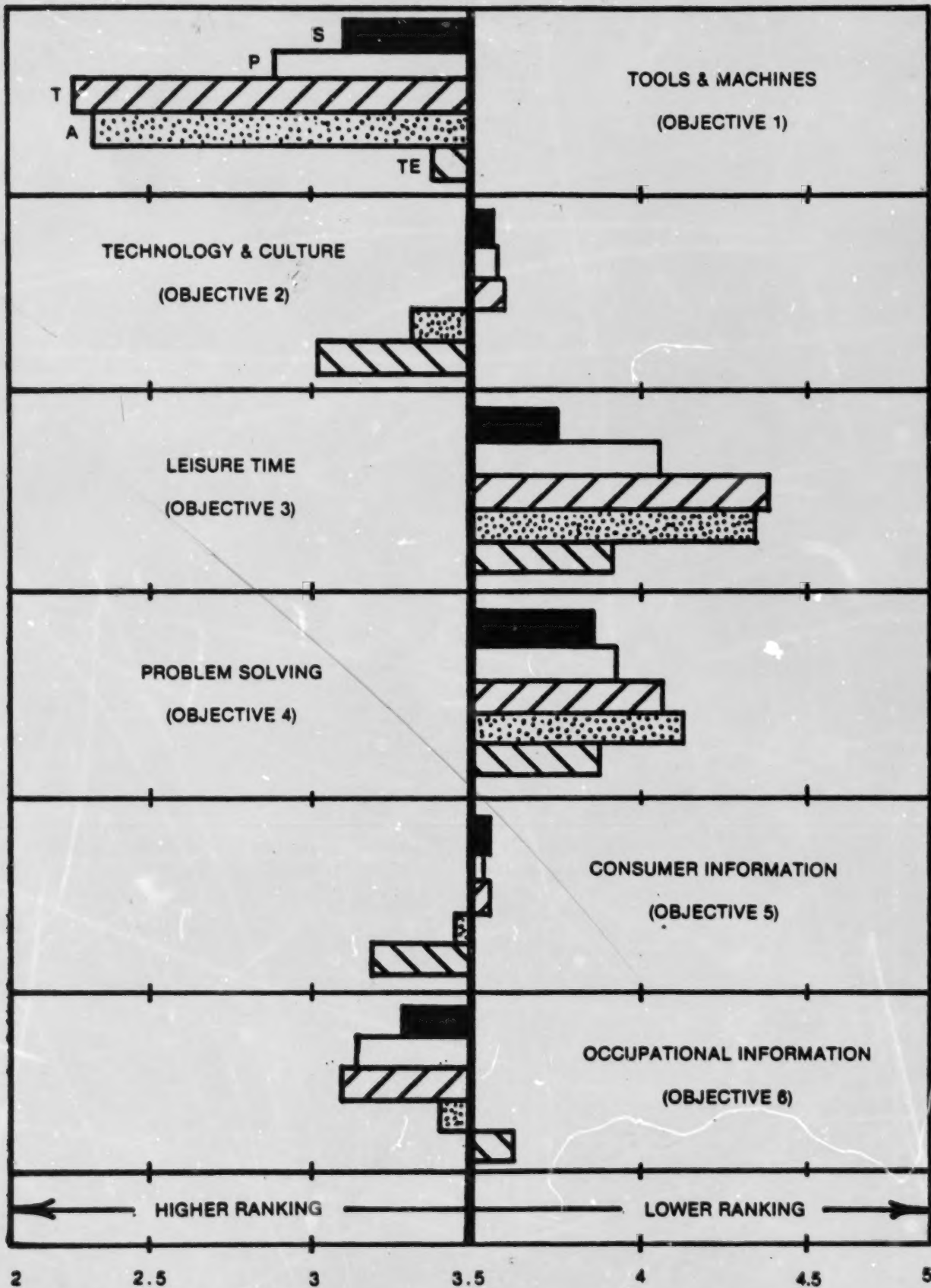
Respondent Survey Results

The results of the study are graphically represented in Figure 5. The bar graph illustrates the importance of each of the six objectives as viewed by the five respondent groups. The bold vertical center line represents an average ranking of 3.5 which would occur if all six objectives had received the same rating scores. The length of each bar left or right of this center line indicates the relative importance of an individual industrial arts objective when compared to the other five objectives. Each of the five bar types represents one of the respondent groups.

The students, parents, and teachers ranked the objectives almost identically. Those elements associated with tools and machines ranked first in importance. Occupational information ranked second. Rankings representing technical culture and consumer information fell near the midpoint. Elements associated with leisure time and problem solving ranked the farthest to the right of the vertical line and consequently are deemed to be of lesser importance by all groups of respondents.

Parents' and teachers' objective rankings were identical in sequence, but differed significantly in the weighted value placed on each objective. The industrial arts teachers placed the significantly higher emphasis on the

FIGURE 5



elements associated with tools and machines than did the other respondent groups. This high rating also corresponded to a significantly lower rating for leisure time activities.

Students' rankings of industrial arts objectives showed a smaller overall divergence. The student rankings of leisure time and problem solving were transposed when compared to the teachers and parents. In general, parents, students, and teachers agreed on the priority of ranking objectives including agreement on corresponding emphasis to be placed on each objective.

The industrial arts supervisory group rankings were similar to the teachers, parents, and students. The major difference occurred in the ranking of the technology and culture objective. The supervisors rated this objective noticeably higher than the teachers, parents, and students. The ranking of this objective was more closely in line with the teacher education rating. Corresponding decrease in the occupational information was noted although the rating remained on the high side (left) of the 3.5 average vertical line.

Major shift in priority occurred when teacher educators ranked the objectives. Technology and culture ranked first with consumer information ranking second. Occupational information was ranked significantly lower. Teacher educators were the only group to rate this objective to the lower side of the center line. Leisure time and problem solving elements obtained rankings corresponding to the other four groups rating of these objectives. The rating by teacher educators shows a definite change in objective priority when compared to the other four respondent groups.

Summarizing the objective rankings, students agree that teachers emphasize and teach the items students think are the most important. These

items center on the safe use of tools and machines and occupational information. The parents of these students also agree with the teachers' and students' priorities. Supervisors show some preference to emphasizing elements closely associated with teaching technology and culture related concepts. Major differences in objective ranking occur when teacher educators prioritized the six industrial arts objectives and their associated elements. A high degree of emphasis is placed on technical literacy at the expense of occupational information and practical use of tools and machines. These results may highlight an existing problem illustrating the major philosophical differences facing the profession.

Geographical Considerations

The parent and student population were categorized into urban, suburban, and rural geographical classifications. The same statistical procedures and graphing was used for these geographical groups. The mean score and ranking for parents students, and teachers as shown in Figure 6. The mean score for each respondent group considering geographical areas are shown in Figure 7. The three geographical student groups priority ranked the objectives in the same rank order although rural students' weighing of occupational information was significantly higher than the other two groups of regional respondents.

The parents of rural and suburban students ranked the objectives in an identical rank order. The three parent groups ranked occupational information objective second in importance but the urban parents' rated occupational information significantly lower than the other two geographical respondent groups. The urban parents' significantly lower score corresponded to the urban students' lower score for this objective. It would appear from this data that occupational information is of greater significance to students

FIGURE 6

Mean Objective Scores For Respondents

	<u>OBJECTIVE I</u>		<u>OBJECTIVE II</u>		<u>OBJECTIVE III</u>		<u>OBJECTIVE IV</u>		<u>OBJECTIVE V</u>		<u>OBJECTIVE VI</u>	
	Use of tools and machines		Understanding of technology		Leisure time		Problem solv- ing skills		Consumer knowledge		Occupational choices	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
<u>Students</u>	3.090	1	3.533	4	3.737	5	3.857	6	3.522	3	3.271	2
<u>Parents</u>	2.871	1	3.565	4	4.061	6	3.914	5	3.504	3	3.145	2
<u>Teachers</u>	2.266	1	3.568	4	4.420	6	4.083	5	3.539	3	3.121	2

FIGURE 7

Mean Objective Scores For Geographical Areas

<u>OBJECTIVE I - Use of tools and machines</u>							<u>OBJECTIVE II - Understanding of technology</u>						
	Rural		Urban		Suburban			Rural		Urban		Suburban	
	Mean	Rank	Mean	Rank	Mean	Rank		Mean	Rank	Mean	Rank	Mean	Rank
<u>Parents</u>	2.871	1	2.822	1	2.903	1		3.549	4	3.609	4	3.525	3
<u>Students</u>	3.051	1	3.041	1	3.128	1		3.616	4	3.519	4	3.485	3
<u>OBJECTIVE III - Leisure time activities</u>							<u>OBJECTIVE IV - Problem solving skills</u>						
	Rural		Urban		Suburban			Rural		Urban		Suburban	
	Mean	Rank	Mean	Rank	Mean	Rank		Mean	Rank	Mean	Rank	Mean	Rank
<u>Parents</u>	4.128	6	3.872	5	4.079	6		3.938	5	3.880	6	3.974	5
<u>Students</u>	3.792	5	3.684	5	3.740	5		3.932	6	3.879	6	3.846	6
<u>OBJECTIVE V - Consumer knowledge</u>							<u>OBJECTIVE VI - Occupational choices</u>						
	Rural		Urban		Suburban			Rural		Urban		Suburban	
	Mean	Rank	Mean	Rank	Mean	Rank		Mean	Rank	Mean	Rank	Mean	Rank
<u>Parents</u>	3.518	3	3.474	3	3.539	4		3.011	2	3.364	2	2.987	2
<u>Students</u>	3.531	3	3.510	3	3.551	4		3.097	2	3.371	2	3.255	2

Parents:
 Rural 208
 Urban 355
 Suburban 241
 Total 804

Students:
 Rural 393
 Urban 541
 Suburban 527
 Total 1,461

Teachers:
 Total 285

and parents in suburban and rural geographical regions.

Figure 7 illustrates the differences that occur in the degree of significance between pairs of objective ratings. The data is classified by the groups of respondents in the 3 geographical areas. The statistical calculations were performed to assure that rank order of each objective statistically differed from the other four objectives. The large (S) indicates that the level of significant difference was above the .0001 level when a one-way analysis of variance utilizing the Tukey HSD procedure was performed. Only the rating between objectives 2 and 5 produced no significant difference (NS) in rating scores. All other objective pairs have significant differences although the degree levels varied. The significant difference between objective 6 and 1 should be noted to further illustrate the emphasis each group of respondents placed on this objective. Although the groups maintained the same chronological rank order the weighting of each score was significantly different for the 3 geographical groups. Slight variations in parents weighting of objectives is shown in Figure 8. The teachers and students ranked and weighted the objective with an identical pattern. The noticeable differences occurred in parent ratings between objective pairs (2 & 5) and (3 & 4) as illustrated in Figure 9.

Individual Element Ratings

The survey form contained forty-eight individual rating elements. The element "safe instruction of tools and machines" was the only element to have unanimity in rating by a majority of respondent groups. Figure 10 lists the forty-eight individual elements and their corresponding rank by each of the respondent groups. The rankings produced a high positive correlation between the various respondent pairs of .835 for teachers and parents,

FIGURE 9

OBJECTIVE STATISTICAL DIFFERENCE BY RESPONDENT GROUPS

OBJECTIVE		LEGEND					
		<u>Population</u>			<u>Degree of Significance</u>		
		P = Parents T = Teachers S = Students			. = .05 .. = .01 ... = .001 S = .0001		
(TOOLS & SAFETY)....1	1						
(TECH. & CULTURE)..2	2	S					
(CREATIVITY & LEISURE)....3	3	S	S				
(PROBLEM SOLVING)..4	4	S	S	P = . T = ... S = ...			
(CONSUMER).....5	5	S	P = .. T = NS S = NS	S	S		
(OCCUPATIONAL).....6	6	S	S	S	S	S	

FIGURE 8

OBJECTIVE STATISTICAL DIFFERENCES BY GEOGRAPHICAL AREAS

OBJECTIVE

(TOOLS & SAFETY)....1	1					
(TECH. & CULTURE)..2	S	2				
(CREATIVITY & LEISURE)....3	S	R = . U = . S = ..	3			
(PROBLEM SOLVING)..4	S	S	R = . U = .. S = ..	4		
(CONSUMER).....5	S	NS	R = .. U = ... S = .	S	5	
(OCCUPATIONAL).....6	R = NS U = ... S = NS	R = ... U = .. S = ...	S	S	S	6

LEGEND

Areas
R = Rural
U = Urban
S = Suburban

Degree of Significance
 . = .05
 .. = .01
 ... = .001
 S = .0001

.935 for parents and students, and .743 for teachers and students. There was no significant difference in the rating of male and female respondents.

The teachers differences appear to be associated with skills required for instruction such as the elements "reading a ruler", and "doing line and mass production activities" which ranked second and eleventh in importance. Elements related to occupational information also received slightly lower rating from the teachers.

The industrial arts supervisors were less occupationally oriented in ranking the individual elements. Supervisors rankings were closely aligned with the teachers rankings by rating elements of tools and machines high. The supervisors high ranking of the elements relating to teaching industry paralleled the teacher educators rankings. Supervisors and teacher educators show a definite preference for items closely associated with technology and industry.

Teacher educators appear to be highly word conscious. A major example is that the element "explore job interest" ranked first, but an associated occupational element "get a job" ranked 37th. Other elements which were vocationally oriented also received low rankings by teacher educators. Those elements that mention the words "industry" or "technology" received a high priority. Elements relating to present technological problems were also rated higher by teacher educators. The composite of these elements accounted for the overall high ranking of Objective II (technology/culture).

Question Responses

The survey attempted to clarify some programmatic questions which are continually asked of the industrial arts profession. Industrial arts educators have long promoted the requiring of industrial arts courses during the secondary school years. This survey attempted to determine to

ELEMENTS	RANK					ELEMENTS	RANK				
	P	S	T	A	C		P	S	T	A	C
1. Use basic hand tools	10	13	6	5	22	25. Choose best products (auto, TV, etc.)	25	17	21	20	7
2. Understand how mechanical things work	5	3	30	15	3	26. Observe job opportunities (field trips, speakers)	12	20	10	10	17
3. Design and build home projects . .	45	38	46	48	45	27. Build project using tools and machines	8	5	5	12	28
4. Measure	39	42	12	31	29	28. Know history of tools and machines	46	46	45	41	43
5. Identify quality workmanship . .	34	44	32	39	31	29. Tune up autos and make minor repairs	27	23	37	37	34
6. Use excellent job work habits . .	6	11	20	17	15	30. Identify methods of home energy conservation	29	30	31	33	21
7. Learn about industry	24	19	17	6	8	31. Work in job training class . . .	3	5	18	38	47
8. Do hobby, craft activities	43	40	44	35	44	32. Read a ruler	17	16	2	3	16
9. Do a mechanical drawing to scale .	41	41	38	32	38	33. Understand how metal, wood, plastic are made	26	32	24	23	2
10. Buy materials, tools and equipment wisely	20	28	28	23	13	34. Enjoy taking pictures with camera	48	48	48	43	41
11. Try job skills (plumber, brick-layer)	32	33	26	26	27	35. Use metric measurement	23	29	36	29	18
12. Use safe working habits (wear goggles, guards)	1	1	1	1	20	36. Care for furniture, auto, etc. .	14	12	23	22	23
13. Make home repairs	22	15	34	27	32	37. Care for tools and machines. . .	2	4	4	2	10
14. Figure the cost of a board	47	47	47	28	48	38. Understand energy (solar, nuclear, electrical)	21	22	16	9	5
15. Recognize good quality wood, metal and plastic products	18	8	22	13	6	39. Put together model kits	42	37	43	44	30
16. Explore job interests	19	21	9	7	1	40. Measure electricity	44	45	39	46	35
17. Use basic machines (drill press, band saw)	9	7	3	16	14	41. Select materials for personal projects	31	25	15	8	24
18. Read technical writings (blue-print, words)	30	35	35	36	40	42. Do job training	13	10	19	40	42
19. Know how materials are made . . .	36	36	33	30	12	43. Do line and mass production activities	28	26	11	14	11
20. Recognize quality tools and machines	11	9	25	21	19	44. Do creative designs	35	39	27	42	9
21. Compare different jobs for future work	16	27	14	18	26	45. Compute horsepower of engine . .	38	34	41	42	39
22. Identify basic hand tools (hammer, saw, rule)	15	18	7	11	33	46. Use credit	40	43	40	45	36
23. Understand industry (labor, management)	33	24	29	9	4	47. Get a job	4	2	13	34	37
24. Enjoy working with wood	37	31	42	47	46	48. Identify basic machines (lathe, jig saw, grinder)	7	14	8	4	25

LEGEND: P-Parents S-Students T-Teachers A-Administrators C-College Prof.

FIGURE 10

what degree parents and students agreed with the concept. An analysis of the data showed that 59% of the students and 73% of the parents responded positively to requiring industrial arts at some secondary level.

"Should both boys and girls have industrial arts experiences?" was the second question asked of the respondents. Eighty-seven percent of the student responses favored both sexes taking industrial arts classes. Ninety percent of the parents responded affirmatively to having both boys and girls in industrial arts classes. Why students enroll in industrial arts courses is a major consideration to the industrial arts curriculum designer. Knowing the reason for students' selection of an industrial arts course should assist curriculum planners in developing more relevant student activities and teaching strategies. The students were given a choice of the following six reasons for taking an industrial arts course: liked the class, needed credit, a required course, get an easy credit, job information, and like to build things.

The student and parent responses to this particular question greatly paralleled one another. Twenty-two percent of the students and a similar percentage of the parents said the reason they took industrial arts was because the "liked the class". "Like to build things" was the major reason (49%) for students and (57%) for parents selecting industrial arts courses.

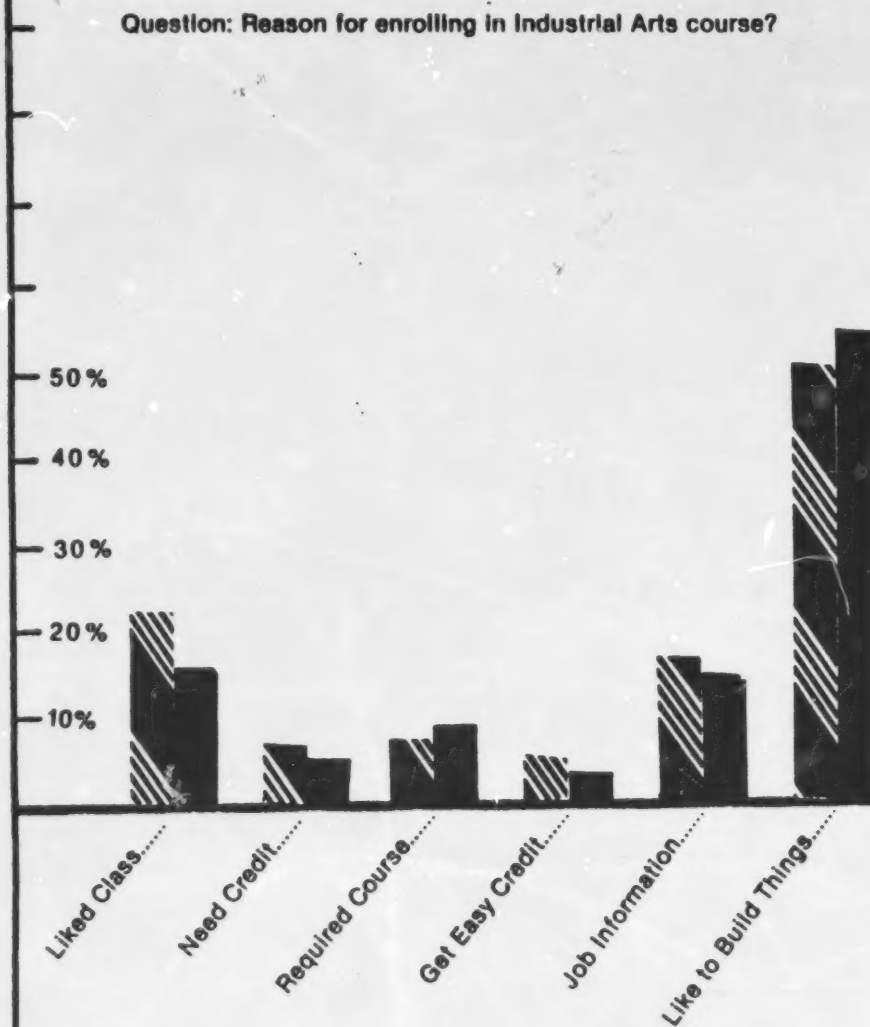
To further analyze industrial arts curriculum offerings, the following question was asked: "Which area of industrial arts do you believe is most important?" The following six categories of possible answers were provided: wood and metal, drafting, electronics, mechanics, construction, and printing.

Similar rankings again existed between parents and students. Parents and students rated wood and metal area slightly higher than the other instructional areas. An analysis of this particular information would indicate that initial industrial arts student experiences should be of the general shop nature since no one instructional area received a significantly higher rating. Furthermore, assuming that the survey could have provided an opportunity for wood and metal to be categorized separately, all the areas may have shown similar preferences. In summary, the respondents' answers to these programmatic questions may illustrate why students take industrial arts and the types of courses and programs which are preferred at various instructional levels. The "learn by doing" concept is still a major consideration for enrolling in industrial arts courses. The small number of females in these courses should be a concern requiring further study to develop alternatives for more girls to enroll in industrial arts courses. The only major solution to increasing female participation may be through the requiring of industrial arts programs at the junior high school level. The results of these survey questions are graphically illustrated in Figures 11 and 12.

 STUDENTS
 PARENTS

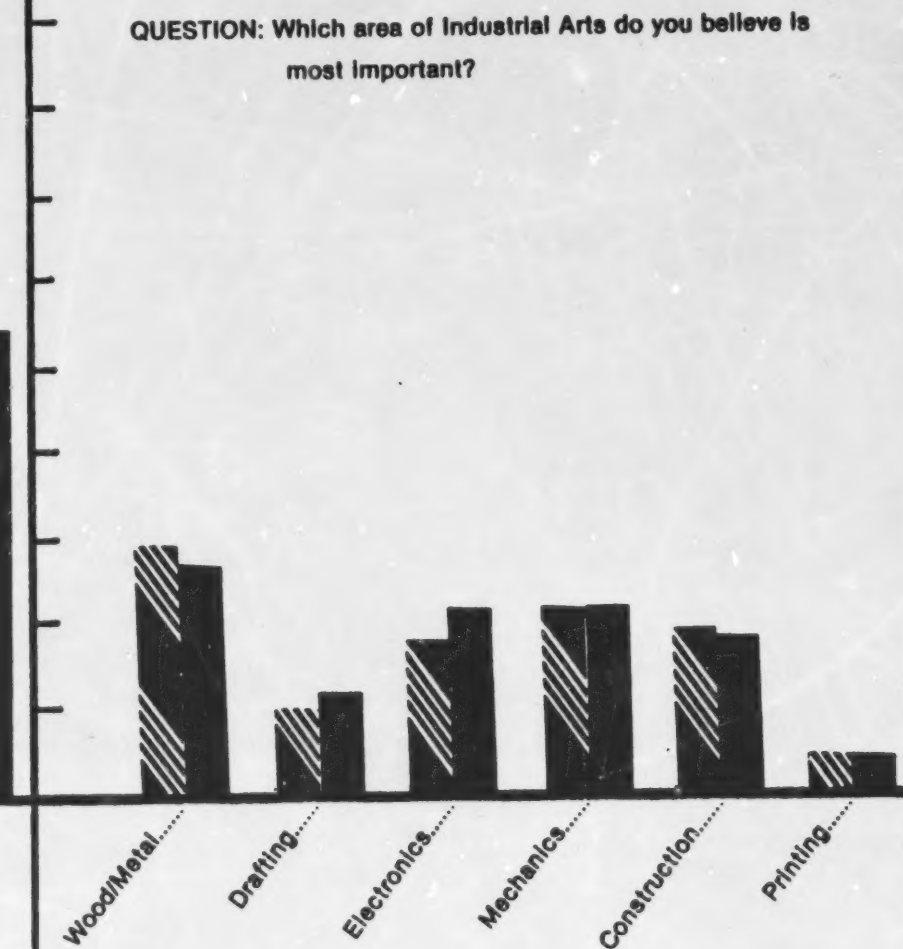
FIGURE 11

Question: Reason for enrolling in Industrial Arts course?



 STUDENTS
 PARENTS

QUESTION: Which area of Industrial Arts do you believe is most important?



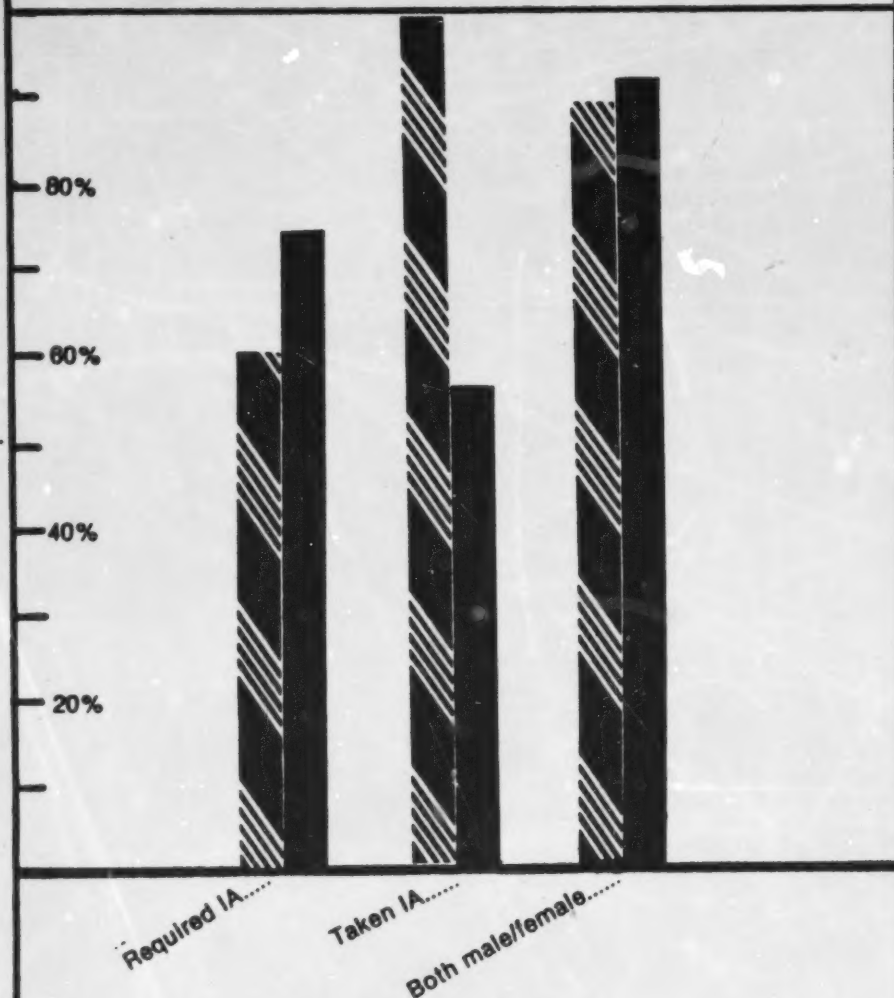


STUDENTS



PARENTS

FIGURE 12



Questions: Have you taken an Industrial Arts course?

Should Industrial Arts courses be required at some level?

Should both boys and girls have Industrial Arts experience?

EVALUATION OF PROJECT

The research project was successfully completed within the allotted time frame and budget. The project met all the goals and objectives stated in the original R.F.P. and the George Mason research proposal. The State Advisory Committee actively functioned in a monitoring capacity to insure that the data obtained reflected industrial arts programs through the Commonwealth of Virginia. The local Advisory Committee dealt with routine matters and assisted the Project Director in the decision making process with items requiring immediate action. This advisory model is highly recommended for utilization in future research.

The research instrument formulated proved to be a highly effective means of obtaining data from a broad spectrum of respondents. The mark-sense form was an efficient and effective means of scoring, tabulating and calculating the data. Furthermore, the forced-choice method provided the prioritizing of industrial arts objectives and subject matter. The data retrieving process was rated as highly successful by the Advisory Committee.

The findings of the research were tabulated and presented at both the American Industrial Arts Association Conference in Hartford, Connecticut and the American Vocational Association Conference in Atlanta, Georgia. The results and research project design were praised by the profession at these conferences and a solicited major article was published in "School Shop".

Due to budget cuts data on teacher education was not collected. Data from teacher education as well as data from the labor and business community would be a valuable asset in comparing teacher/student objectives with the perceived occupational needs of business and industry. Future research should strongly address the occupational function of Industrial Arts.

CONCLUSIONS

The laboratory environment appears to have a distinct affect upon determining the goals of industrial arts. The results of this research indicate that the infusion of tools and machines is a significant consideration in development of industrial arts curriculum strategies. The research data from students, parents, teachers, and administrators supports this fact. The strong emphasis on the occupationally related elements within the industrial arts program of instruction may also be attributed to the physical laboratory environment, since the atmosphere of an industrial arts class visually represents an industrial working place. The laboratory factor and the higher occupational ranking may far outweigh general education value of industrial arts. Parents obviously expect their children enrolled in industrial arts courses to be better occupationally oriented. This perception could create a major problem for industrial arts credibility if the parents perceive a strong correlation between job placement and pre-vocational course enrollment. The overall objective ranking may also reflect the present economic trends. The research showed an obvious decline in the value of the avocational role of industrial arts.

Teacher education should seek to further define its mission. A teacher must be prepared to teach what parents, students, and administrators expect. Although numerous efforts have been expended to promote technology as a part of industrial arts, it appears that traditional industrial arts values still remain dominant. Emphasizing technology may be of major importance at some level of instruction, but it does not presently appear to have the overwhelming support or understanding at the public school level.

The standards for industrial arts have been finalized. This document has had strong input from the industrial arts educators and should accurately reflect the views of the profession. If these standards are to remain as a future measurement of industrial arts, the profession must continually seek input from business, industry, parents, and students so that the product of our programs meets their expectations.

This research has shown the present status of industrial arts and the present benefits perceived by parents, teachers, and students. Further research should be conducted to determine business, industry, and labors perceptions of industrial arts programs and courses. Furthermore, a determination should be made as to industrial arts role and degree of involvement in occupational education. To accomplish this task joint program research and planning should be initiated by the State Department of Education.

In the final analysis this research study has shown that industrial arts courses objective priority and teaching is what parents presently expected of industrial arts programs. Future research should be conducted to determine what new directions should be emphasized and which traditional values need to be maintained and strengthened.

APPENDIX A**SAMPLE CORRESPONDENCE**

GEORGE MASON UNIVERSITY

43

THE STATE UNIVERSITY IN NORTHERN VIRGINIA ■ 4400 UNIVERSITY DRIVE ■ FAIRFAX ■ VIRGINIA ■ 22030

Department of Education
(703) 323-2421

September 8, 1980

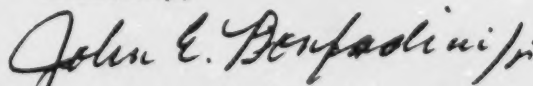
George Mason University has been awarded the research funded project entitled "A Study to Determine the Benefits of Industrial Arts Instruction On Secondary Students in Virginia". Your willingness to serve as a member of the State Advisory Committee for this project was a major factor in the University's obtaining the research grant. The Industrial Education staff at George Mason University conveys our sincere thanks.

The initial meeting of the State Advisory Committee will be held at George Mason University on September 26 and 27. The formal meeting is scheduled to begin on Friday evening at 7:00 in the Dean's Conference room located on the second floor of Robinson Hall. The Quality Inn Motel on Route 50 (exit of I-66) in Fairfax will provide the overnight accommodations. The hospitality room will open at 5:00 p.m. for early arrivals. Please arrange for your own evening meal. Committee members who choose to commute should meet at the Quality Inn before 6:00 p.m. Committee departure for the university campus will begin at 6:30 p.m. The Saturday meeting is scheduled from 8:00 a.m. to 2:00 p.m.

All travel reimbursement will follow regular state guidelines--please travel with another committee member when possible. A registration fee of \$5.00 will be charged and reimbursed through regular procedures. Committee members will receive a \$100 honorarium.

We are looking forward to seeing you on the 26th.

Sincerely,



Dr. John E. Bonfadini
Project Director

JEB/jj

Enclosure

APPENDIX B

STATE ADVISORY COMMITTEE
INDUSTRIAL ARTS RESEARCH GRANT

STATE ADVISORY COMMITTEE - INDUSTRIAL ARTS RESEARCH GRANT

Mr. Thomas A. Hughes, Jr.
State Supervisor--Industrial Arts
Department of Education
P.O. Box 6-Q
Richmond, VA 23216
(804) 786-2642

Mr. Paul Cummings
Supervisor, Industrial Arts
12465 Warwick Blvd.
Newport News, VA 23606
(804) 599-8729

Mr. Hugh D. Byrd
Coordinator, Industrial Arts
Henrico County
P.O. Box 40
Highland Springs, VA 23075
(804) 737-3417

Mr. William Eister
Supervisor, Industrial Arts
301 N. Ninth Street
Richmond, VA 23219
(804) 780-8618

Mr. Ward Lockett
Director, Vocational Education
Route 2, Box 575
Hot Springs, VA 24445
(703) 839-5774

Mr. Bernard L. Hairston
Stafford Jr. High School
Box 8
Stafford, VA 22554
(703) 659-2171

Mr. Jerry Weddle
Hidden Valley Junior High
4901 Mt. Holland Dr.
Roanoke, VA 24081
(703) 989-0836

Dr. Jerry Hardy
Director Vocational Education
526 College Avenue
Salem, VA 24153
(703) 389-0861

Mr. Pete Egan
Director, Vocational Education
8200 Euclid Avenue
Manassas Park, VA 22110
(703) 361-9131

Mr. Dave White
Stonewall Jackson High School
8820 Rixlew Lane
Manassas, VA 22110
(703) 368-2107

Mr. George Litman
Supervisor, Industrial Arts
6131 Willston Drive
Falls Church, VA 22044
(703) 573-4595

Mr. Kent Clark
Supervisor, Vocational Education
9000 Tudor Lane
Manassas, VA 22110
(703) 791-3111, x216

Mr. David W. Marsh
Asst. Superintendent
Manassas Park Schools
8462 Sandstone Way
Manassas Park, VA 22110
(703) 361-9107

Mr. Pete Fulcer, Director
Vocational & Adult Education
30 West North St.
Leesburg, VA 22075
(703) 777-1222

Dr. Marjory Brown
Professor of Education - GMU, x2499

Dr. Wayne Thomas
Asst. Professor of Education - GMU, x2579

Mr. James Clark - GMU, x2650

Dr. John Bonfadini
Assoc. Professor of Education - GMU
Project Director, (703) 323-2606

Dr. W. J. Haynie, III
Asst. Professor of Education - GMU
x2605

APPENDIX C

TRAVEL EXPENSE WORKSHEET

TRAVEL EXPENSE WORKSHEET

1. Name _____ Title _____
 Institution/Agency _____
 Mailing Address _____ zip _____

2. Purpose of trip _____

3. Departed from _____ on _____
 Destination _____ Returned on _____

Please check mode of travel and include all original receipts:

a.) Airplane _____ c.) Personal Car _____ Total Mileage _____
 (at 18.5¢ per mile)
 b.) State Car _____ d.) Other _____

4. Meals (by State guidelines, meals are reimbursed up to \$22.00 per day including taxes and tips--\$5.00 for breakfast, \$5.00 for lunch, \$12.00 for dinner.)

Dates	Meals: Breakfast/ Lunch/Dinner	Meal Expense	Tips	Total Amount
_____	B L D	_____	_____	_____
_____	B L D	_____	_____	_____
_____	B L D	_____	_____	_____
_____	B L D	_____	_____	_____

5. Lodging: (State guideline "as reasonable for the area")

Attach receipts

Hotel/Motel _____

Total amount

Shared room with _____ to be reimbursed \$ _____

Official phone calls (points between calls and name of person called)

6. Parking and/or Tolls _____ If you have parking and/or toll charges, place a check on the line above. Then specify on back of this worksheet the dates, locations, and charges for each toll and/or parking expense. Attach receipts if possible.

7. Miscellaneous (Specify, include dates, and attach receipts)

APPENDIX D

OLSON'S FUNCTIONS OF INDUSTRIAL ARTS

OLSON'S FUNCTIONS OF INDUSTRIAL ARTS

1. The Orientation Function Experiences in industrial arts should help the junior and senior high school pupil become better oriented in an industrial society by exploring many types of tools, materials, processes, products, and occupations. Manipulation should be primarily a means for promoting other ends. Habits and skills derive their value from appropriate use. The emphasis is rather upon obtaining a pattern of knowledge, attitudes, habits, skills, and understandings essential to individual and group welfare in a technological society. One of the basic outcomes of the orientation function is its value in assisting the pupil in making an occupational choice which may lead him into vocational preparation in the final years of his educational program.
2. The Technical Function Industrial arts should provide as many opportunities as possible for pupils to spend at least a year in any phase of work where orientation may help to define specialized interests that can be pursued with profit. The opportunity, for example, should be provided for a pupil to delve into the intricacies of cabinet or furniture making, electrical communication and power, lighting, automotives, printing a monograph, making a cabin or a boat including drawing the design and writing the specifications, designing and making a small machine, studying the occupational possibilities of certain local industries, or any similar problem or group of related problems in one or more areas of the industrial arts program.
3. The Avocational Function Industrial arts also provides opportunities to cultivate a wide variety of useful, wholesome, enduring leisure time, interests, and activities. Collection and appreciation is involved in addition to manipulation. The importance of this function is increasing. There is now almost as much time for leisure as for labor and sleep together. Increased leisure time affords not only an educational opportunity but it also becomes a liability and a responsibility with which the school must cope.
4. The Consumer Function A primary purpose of industrial arts is to aid the individual in developing intelligent attitudes and understandings concerning the selection and use of the products of industry. This involves studies and experiences covering a variety of topics and problems ranging from the production of raw materials, through the processes and problems involved in their manufacture, to the distribution of finished products and their wise use by the ultimate consumer. It should and must help him achieve consumer literacy since he needs to live intelligently in the midst of an involved technology.
5. The Social Function Experiences in industrial arts through activities in the shop or laboratory, as well as outside, should help the students develop desirable social habits and attitudes. The program is concerned, for example with helping pupils understand and formulate wholesome opinions toward such things as integrity of workmanship, sanitation, housing, wages and hours of labor, safety, preservation of natural resources, or any other related social problem.

OLSON'S FUNCTIONS OF INDUSTRIAL ARTS (continued)

6. The Cultural Function Experiences in industrial arts should help the individual enjoy a finer culture as regards materials in an involved technological society. This means helping him develop and use his material inheritance. For example, the pupil can learn to know style or design in architecture, furniture, rugs, pottery, silverware, glass, dress, china, printing, machinery, and other items of common use, and appreciate the forces that have influenced them. With a cultured taste, he is prepared to surround himself with those things from which he can derive life-long satisfaction (70, pp. 10-12).

APPENDIX E

INDUSTRIAL ARTS OBJECTIVES

TABLE 4

Rank Order Listing of Purposes of IA by Current Degree of Emphasis

PURPOSES OF INDUSTRIAL ARTS	RANDOM SAMPLE			AIASA SAMPLE			EXEMPLARY SAMPLE			** COMPARISON OF SCHMITT & PELLEY	
	RESPONDENT			RESPONDENT			RESPONDENT			TCNM	PRIN
	C	GC	P	C	GC	P	C	GC	P		
Skill in tools and machines	1	1	1	1	1	1	1	1	1	1	1
Provide technical knowledge and skill	2	2	2	2	3	3	2	2	2	4	4
Discover and develop creative talent	3	3	3	3	2	2	3	3	3	3	2
Develop worthy leisure time interests	4	5	4	7	6	5	5	7	5	7	3
Develop problem solving skills	5	6	7	4	7	9	4	5	8	2	5
Make informed educational-occupational choices	7	6	5	5	9	4	6	9	4	na	na
Provide pre-vocational experiences	9	4	6	8	5	7	9	5	6	9	6
Understand technical culture	6	9	9	6	8	7	7	8	7	5	7
Provide vocational training	10	7	8	12	4	6	11	4	9	10	8
Develop consumer knowledge and appreciation	8	11	10	10	12	10	6	11	10	6	9
Develop an understanding of the nature and characteristics of technology	11	12	11	9	10	11	10	10	11	na	na
Understand the application of science and mathematics	12	10	12	11	11	12	12	12	12	8	10

* C= Ind.arts chairperson; GC= Guidance coordinator; P= Principal.

** Rank order listings used in comparison were from 1966 report by Marshall Schmitt and Albert Pelley.

Table A.—Purposes of industrial arts rated by public secondary school principals according to degree of emphasis, and ranked according to percent believing each objective rated high: United States, 1962-63

Rank	Purpose	Degree of emphasis			Nonre- sponse
		High	Medium	Low	
1	To develop in each student a measure of skill in the use of common tools and machines	73.4	22.4	1.4	2.6
2	To discover and to develop creative technical talents in students	53.5	39.2	4.2	2.9
3	To develop worthy leisure-time interests	42.7	43.5	11.0	2.6
4	To provide general all-around technical knowledge and skills	42.5	45.5	8.4	3.3
5	To develop problem-solving skills relating to materials and processes ..	38.3	50.5	7.8	3.4
6	To provide prevocational experience of an intensified nature for those students interested in technical work	34.9	39.1	22.4	3.4
7	To develop an understanding of our technical culture	34.3	53.1	8.6	3.7
8	To provide vocational training for students who would not otherwise have this opportunity	32.9	37.0	26.3	3.6
9	To develop consumer knowledge and appreciation and use of industrial products	29.9	50.0	16.3	3.6
10	To develop an understanding of the application of science and mathematics	27.2	55.6	13.2	3.8

CONTINUING INSTRUCTIONAL OBJECTIVES

The Industrial Arts program stresses the following instructional objectives:

1. To develop in each student an insight and understanding of technology and industry and their place in our society and the free enterprise system.
2. To discover and develop individual talents, attitudes, interests and potentials as related to industry and technology.
3. To develop technical problem-solving skills related to materials and processes.
4. To develop in each student basic skills in the safe use of the common tools and machines.

Composite Objective #1

Standards Objectives _ _ _

Composite Objective #2

Standards Objectives _ _ _

Composite Objective #3

Standards Objectives _ _ _

Composite Objective #4

Standards Objectives _ _ _

Composite Objective #5

Standards Objectives _ _ _

APPENDIX F

PRIORITY RANKING SHEET

PRIORITY RANKING SHEET

1. Provide technical knowledge and skill in the use of tools and machines.

- ☐ Identify basic hand tools (hammer, saw, rule).
- ☐ Use basic hand tools (screwdriver, wrench, square).
- ☐ Identify basic machines (lathe, jig saw, grinder).
- ☐ Use basic machines (camera, drill press, band saw).
- ☐ Care of tools and machines (sharpen drill bit, knife).
- ☐ Build project using tools and machines.
- ☐ Read a rule.
- ☐ Safe working habits (wear goggles, guards).

2. Develop an understanding of the nature and characteristics of technology in our culture.

- ☐ Technical reading (blueprint, drawing, words)
- ☐ Understand how metal, wood, plastic are made.
- ☐ History of tools and machines.
- ☐ Understand industry (manufacturing, construction).
- ☐ Understand industry (labor, management).
- ☐ Do line and mass production activity.
- ☐ Understand energy (solar, nuclear, electrical).
- ☐ Understand how mechanical things work.

3. Discover and develop creative talent for worthy leisure time interests.

- ☐ Enjoy working with wood.
- ☐ Enjoy taking pictures with camera.
- ☐ Design and build home projects.
- ☐ Make home repairs.
- ☐ Do hobby, craft activities.

_____ Put together model kits (electrical, leather, airplanes).

_____ Tune-up auto and make minor repairs.

_____ Creative design (greeting cards, T-Shirts, signs)

4. Understand the application of science and math in developing problem solving skills.

_____ Know how to measure.

_____ Figure the cost of a board.

_____ Use metrics.

_____ Do a drawing to scale.

_____ Figure horsepower of engine.

_____ Measure electricity using a meter.

_____ Know how materials are made (chemical/physical).

_____ Identify methods of home energy conservation.

5. Develop consumer knowledge and appreciation in use of industrial products.

_____ Recognize quality tools and machines.

_____ Recognize good wood, metal, plastics in product.

_____ Buy wisely.

_____ Select materials for personal projects.

_____ Identify good and poor workmanship.

_____ Choose best product (auto, TV).

_____ Care for furniture, auto, TV, home.

_____ Understand credit system.

6. Provide pre-vocational experiences for making informed occupational-educational choices leading to vocational training.

_____ Job interests.

_____ Compare different jobs.

_____ Observe job opportunities (field trips, speakers).

_____ Try job skills (plumber, bricklayer, carpenter).

_____ Prepare to work in a job training class.

_____ Get a job (interview, application).

_____ Good work habits.

_____ Job training (auto mechanic, draftsman).

APPENDIX G

PARENT LETTER

GEORGE MASON UNIVERSITY

61

THE STATE UNIVERSITY IN NORTHERN VIRGINIA ■ 4400 UNIVERSITY DRIVE ■ FAIRFAX ■ VIRGINIA ■ 22030

Department of Education
(703) 323-2421

April 10, 1981

Dear Parents,

The State Department of Education has funded a research study through George Mason University in Fairfax, Virginia to determine the benefits of industrial arts education for middle and senior high school students. Your child's school has been randomly selected to participate in this study. This is an initial attempt to obtain parents' preferences regarding the type of subject matter which should be taught in industrial arts classes.

Your son/daughter has brought home a mark-sense form for your completion. Please fill it in with a #2 pencil and have your child return it to his/her industrial arts teacher.

The following is an example of a properly completed form. Please use each number only once in each block.

PARENT: In your opinion, which item in each block of items is the most important for your child to learn in an Industrial Arts class. Rank items from 1 (most important) to 6 (least important).

LEARN TO:	A. Use basic hand tools (screwdriver, wrench)	=1=	=2=	=3=	=4=	=5=	=6=
	B. Understand how mechanical things work	=1=	=2=	=3=	=4=	=5=	=6=
	C. Design and build home projects	=1=	=2=	=3=	=4=	=5=	=6=
	D. Measure	=1=	=2=	=3=	=4=	=5=	=6=
	E. Identify good and poor workmanship	=1=	=2=	=3=	=4=	=5=	=6=
	F. Use excellent job work habits	=1=	=2=	=3=	=4=	=5=	=6=
BLOCK I							

*PROPER
each number used
only once*

The following is an example of an improperly completed form. The same numbers are used more than once.

LEARN TO:	A. Learn about industry	=1=	=2=	=3=	=4=	=5=	=6=
	B. Do hobby, craft activities	=1=	=2=	=3=	=4=	=5=	=6=
	C. Do a mechanical drawing to scale	=1=	=2=	=3=	=4=	=5=	=6=
	D. Buy materials, tools and equipment wisely	=1=	=2=	=3=	=4=	=5=	=6=
	E. Try job skills (plumber, bricklayer)	=1=	=2=	=3=	=4=	=5=	=6=
	F. Use safe working habits (wear goggles, guards)	=1=	=2=	=3=	=4=	=5=	=6=
BLOCK II							

*IMPROPER
numbers used
more than once*

Your participation in this study will help with industrial arts programming throughout the Commonwealth of Virginia. We thank you for your cooperation.

Sincerely yours,

John E. Bonfadini

Dr. John E. Bonfadini, Coordinator
Vocational Education

APPENDIX H

LISTING OF SCHOOLS AND INSTRUCTORS

Mr. Robert D. Hicks, Instructor
George Washington Jr. High
1005 Mt. Vernon Avenue
Alexandria, VA 22301

Mr. Albert McCown, Instructor
Parry McCluer Middle School
2329 Chestnut Avenue
Buena Vista, VA 24416

Iruan Abrams, Instructor
Truitt Jr. High School
1100 Holly Street
Chesapeake, VA 23324

Mr. John Jones, Instructor
Deep Creek High School
1955 Deal Drive
Chesapeake, VA 23321

Mr. Oliver Holley, Jr.
Western Branch High School
4222 Terry Drive
Chesapeake, VA 23321

Mr. Chris Aldrich, Instructor
John M. Langston Jr. High
228 Cleveland Street
Danville, VA 24541

Ms. Susan Gaghan, Instructor
Walker-Grant Middle School
Gunnery Road
Fredericksburg, VA 22401

Mr. Brian Jones, Instructor
Jeff Davis Jr. High School
1435 Todds Lane
Hampton, VA 23666

Mr. Clarence Booth, Instructor
C. Vernon Spratley Jr. High
339 Woodland Road
Hampton, VA 23669

Mr. Charles Kinnison, Inst.
Kecoughtan High School
522 Woodland Road
Hampton, VA 23669

Mr. Jim Starkey, Instructor
James E. Mallonee Int. School
12 Avenue & City Point Rd.
Hopewell, VA 23860

Mr. David Bryan, Instructor
E. C. Glass High School
Memorial Ave & Langhorne Rd.
Lynchburg, VA 24504

Mr. Bill Money, Instructor
Manassas Park High School
8200 Euclid Avenue
Manassas Park, VA 22110

Mr. Tom Cline, Instructor
Huntington Intermediate
3401 Orcutt Avenue
Newport News, VA 23607

Mr. Joe McCade, Instructor
George W. Carver Intermediate
6160 Jefferson Avenue
Newport News, VA 23605

Richard Quintilone, Instructor
Ruffner Jr. High School
489 Tidewater Drive
Norfolk, VA 23504

Mr. Gary Pierce, Instructor
Northside Jr. High School
8720 Granby Street
Norfolk, VA 23502

Mr. William Barter, Instructor
Campostella Jr. High School
1106 Campostella Road
Norfolk, VA 23523

Mr. Alford Johnson, Instructor
Peabody Jr. High School
725 Wesley Street
Petersburg, VA 23803

Ms. Syvonnie Merchant
Woodrow Wilson High School
3701 Willett Drive
Portsmouth, VA 23707

Mr. Douglas Cropper, Instructor
Churchland Jr. High School
4051 River Shore Road
Portsmouth, VA 23703

Mr. John Roane, Jr., Instructor
Radford High School
Dehaven Drive
Radford, VA 24141

Mr. Edward Fitchett, Instructor
Marshall-Walker High
1000 North Lombardy Street
Richmond, VA 23220

Mr. Russell Seldon
Thompson Middle School
7945 Forest Hill Ave.
Richmond, VA 23225

Mr. Charles Farris, Instructor
Stonewall Jackson Jr. High
1022 Ninth Street, S.E.
Roanoke, VA 24013

Mr. Robert Steinmetz, Inst.
James Madison Jr. High
1160 Overlook Road, S.W.
Roanoke, VA 24015

Mr. Alvin G. Richards
Booker T. Washington Jr. High
145 Walnut Street
Suffolk, VA 23434

Mr. John Monroe, Instructor
Forest Glen High School
200 Forest Glen Drive
Suffolk, VA 23434

Mr. William D'Andrea, Inst.
Plaza Junior High School
3080 S. Lynnhaven Road
Virginia Beach, VA 23452

Mr. Willis Alexander, Inst.
Frank W. Cox High School
1848 Great Neck Road
Virginia Beach, VA 23454

Mr. Richard L. Hicks, Inst.
Princess Anne Jr. High School
Route 1, Box 1100
Virginia Beach, VA 23456

Mr. Troy Jenkins, Instructor
James Blair Intermediate
Ironbound Road
Williamsburg, VA 23185

Mr. James Carey, Instructor
Mary N. Smith Middle School
Accomack, VA 23301

Mr. Harry Austin, Instructor
Jackson Burley Middle School
901 Rose Hill Dr.
Charlottesville, VA 22901

Mr. Paul Harding, Instructor
Washington Lee High School
1300 N. Quincy Street
Arlington, VA 22201

Mr. Leroy Murphy, Instructor
Williamsburg Int. School
3600 N. Harrison Street
Arlington, VA 22207

Mr. William Bleugh, Instructor
Buffalo Gap High School
Route 1
Swoope, VA 24479

Mr. Robert Hitchner, Instructor
Valley Elementary
Hot Springs, VA 24445

Mr. Eldred C. Huff, Instructor
James River High School
Buchanan, VA 24066

Mr. Ronald Balnkinship, Inst.
Grundy Senior High School
Grundy, VA 24614

Mr. William Ferguson, Instructor
Brookville High School
1111 Laxton Road
Lynchburg, VA 24502

Mr. William H. Wood, Instructor
Midlothian High School
Midlothian, VA 23113

Mr. Sterling L. Hawkins, Inst.
Meadowbrook High School
4901 Cogbill Rd.
Richmond, VA 23234

Mr. Philip Harding, Instructor
Providence Jr. High School
900 Starlight Lane
Richmond, VA 23234

Mr. John M. March, Instructor
Clarke County High School
200 Swan Avenue
Berryville, VA 22611

Mr. John Boggs, Instructor
Culpepper County Jr. High
500 Achievement Drive
Culpepper, VA 22701

Mr. Barry Blake, Instructor
JEB Stuart High School
3301 Peace Valley Lane
Falls Church, VA 22044

Mr. William Monticone, Inst.
Fort Hunt High School
8428 Fort Hunt Road
Alexandria, VA 22308

Mr. Louis Patch, Instructor
Lake Braddock Secondary
9200 Burke Lake Road
Burke, VA 22015

Mr. Robert Back, Instructor
Luther Jackson Int. School
3020 Gallows Road
Falls Church, VA 22042

Mr. Charles Reynolds, Instructor
Thoreau Intermediate School
2505 Cedar Lane
Vienna, VA 22180

Mr. Gregg Thompson
Cooper Intermediate School
977 Balls Hill Road
McLean, VA 22101

Mr. Leonard Moody, Instructor
Foster Intermediate
2500 Parkers Lane
Alexandria, VA 22307

Mr. Dewitt Fairley, Instructor
Key Intermediate School
6402 Franconia Road
Springfield, VA 22150

Mr. Edward Habrat, Instructor
Warrenton Jr. High School
244 Waterloo Street
Warrenton, VA 22186

Mr. James Waddy, Instructor
Franklin County High School
506 Pell Avenue
Rocky Mount, VA 24151

Mr. David Delp, Instructor
Narrows High School
Woodland Avenue
Narrows, VA 24124

Mr. John Thurston, Instructor
Greensville County Jr. High
RFD 2
Emporia, VA 23847

Mr. Robert Jordan, Instructor
Patrick Henry High School
Route 3, Box 630
Ashland, VA 23005

Mr. William Burton, Instructor
Fairfield Middle School
15 1/2 Stop Nine Mile Road
Richmond, VA 23223

Mr. Glenn Bowman, Instructor
Hermitage High School
8301 Hungary Springs Road
Richmond, VA 23228

Mr. Randall Clary, Instructor
Varina High School
7900 Messer Road
Richmond, VA 23231

Mr. Timothy Janka, Instructor
Smithfield High School
Route 1, Box 115
Smithfield, VA 23430

Mr. Harold Berry, Instructor
Loudoun County High School
205 Dry Hill Road
Leesburg, VA 22075

Mr. James Sugars, Instructor
Seneca Ridge Middle School
66 South Cottage Road
Sterling, VA 22170

Mr. James Land, Instructor
Park View Junior High School
Route 1, Box 192
South Hill, VA 23970

Mr. Joseph Stacy, Jr., Instructor
William Byrd Intermediate
Highland at Washington
Vinton, VA 24179

Mr. Kevin Harris, Instructor
Auburn High & Middle School
Route 8
Riner, VA 24149

Mr. Steven Schwartz, Instructor
Battlefield Intermediate
Route 9, Box 1075
Fredericksburg, VA 22401

Ms. Debra Brodnax, Instructor
New Kent Middle School
Quinton, VA 23141

Mr. Anthony Crocco, Instructor
T. Benton Gayle Middle School
610 Gayle Street, Route 7
Falmouth, VA 22401

Mr. Henry Micks, Instructor
Orange County High School
Selma Road
Orange, VA 22960

Mr. William R. Cannoy, Instructor
Pocahontas High School
Pocahontas, VA 24635

Mr. Frank Jeffries, Instructor
Blairs Junior High School
Route 1
Blairs, VA 24527

Dr. Donald Waters, Instructor
Patrick Henry High School
Route 2
Glade Springs, VA 24340

Mr. Edgar Rawl, Instructor
Prince Edward County Vocational
Route 4, Box 370
Farmville, VA 23901

Mr. Kenneth G. Moore, Instructor
Fort Chiswell High School
Route 1
Max Meadows, VA 24360

Mr. Elmer Magyar, Instructor
Graham Park Middle School
3513 Graham Park Road
Triangle, VA 22172

Mr. Clinton Slade, Instructor
Queens Lake Intermediate
W. Queens Drive
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